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DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
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SANITATION AT MINING VILLAGES IN THE BIRMINGHAM DISTRICT, ALA.

ENGINEERING
NGIN STORAGE

BY

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SANITATION AT MINING VILLAGES IN THE BIRMINGHAM DISTRICT, ALA.

By Dwight E. Woodbridge.

INTRODUCTION.

A sudden mine disaster, by which scores, even hundreds, of lives are extinguished, receives nation-wide attention; but insidious maladies caused by insanitary dwellings, infected water, foul air, and the like, may carry off their toll with few voices raised in protest and fewer still proclaiming remedies that are practical. Yet among miners tuberculosis alone annually takes many times the number of lives that are lost in accidents. Half a million dollars is spent in one year by the iron-mining companies of this country for the installation of devices to prevent accidents, yet in the city of Birmingham, Ala., the rate of deaths from consumption has increased in the past three years from 211 to 277 per 100,000 persons. Advocates of hygienic conditions state that tuberculosis is a greater economic burden than amputated limbs, and that to permit the existence of conditions that spread typhoid is an inexcusable crime. In three years Birmingham has reduced its typhoid death rate from 83.3 to 49.5 per 100,000 individuals, and still the rate is excessively high.

Some employers are alive to the need of conserving the health of employees, and are as careful to preserve the efficiency of their employees by guarding against illness as they are to take precautions against accidents. But in general lives are not safeguarded as they might be nor as humanitarian ideals dictate; nor is it fully realized by all employers that more healthful living conditions mean steadier and more efficient work by employees.

The same care and skill that have done much to avert accidental death in mines can save even more lives by guarding the residents of mining communities from preventable disease.

The purpose of this paper is to show briefly the sanitary conditions in the iron-mining district about Birmingham, Ala., as they were late in 1912, and to describe even more briefly the conditions that existed a few years before, in order that the methods successfully practiced there may be brought to the notice of such other mining districts in the United States as have insanitary conditions and have not as yet made a systematic effort toward betterment.

SANITARY BETTERMENT BY MINING COMPANIES.

Sanitary improvement about the iron mines of the Birmingham region has been made largely under the leadership of one company. Others have followed, one or two of them rather closely, some have lagged, whereas still others have made no attempt to improve conditions that exist about their villages. There is little doubt that both public sentiment and business considerations will compel all companies in the district to take up such work sooner or later.

In 1912 the Alabama Coal Operators' Association employed a sanitary engineer to make investigations of the sanitary and welfare conditions of coal-mining camps.

The Birmingham district contains some excellent examples of what may be accomplished in connection with the sanitation of mining towns. Sanitary conditions in most of the mining towns of the district were remarkably bad, and as most of the mine communities were "company towns" in which the control of all municipal affairs was in the hands of a corporation it could hardly be expected that the work of amelioration would be introduced by the employees. If the corporation desired to correct conditions, it could do so, unhampered by local politics or personal feelings; if it did not, it was able to maintain a policy of inactivity and carelessness, unmoved by local complaints.

Scattered along the slopes of Red Mountain for miles, between the cities of Birmingham and Bessemer, are the company towns in which live the men employed in the Red Mountain iron-ore mines. In the main these camps are under the control of one or another of four companies, two of which are actively engaged in welfare and sanitation work, and a third is making some initial progress toward the same end, whereas the fourth seems almost oblivious to changes in customs and obligations. This work of betterment is new. The critical examinations and surveys upon which were based the recommendations in regard to the work were made in 1910, and since then it has been necessary for the companies to organize sanitation departments, to formulate the desired rules, and to arouse in the workers a desire for more sanitary surroundings.

COMPANY COMMUNITIES AND PRIVATE COMMUNITIES.

Until recently the contrast between a mining settlement owned by individuals and one controlled by some company lay in the greater uniformity of building construction in the latter and in the more regular placing of its houses. Generally speaking, each house, whether a company house or not, has a privy; on account of the regular spacing of the houses the company communities have the appearance of having more privies than private communities. In private

communities there is a well for every house. In a company community one well may serve several houses. However, the wells of the company community, although fewer than those of private communities, are better protected. In regard to the water supply, the private community as a rule has a water tap in each yard, but this is the exception in company communities. The company town wherein there is as yet little thought of sanitation differs from the equally insanitary individual community mainly in having a more uniform layout. The pig, the buzzard, and the chickens are the scavengers, and are almost the only garbage collectors that some settlements have for the larger part of the year; water is brought in by carts or is taken from some contaminable well or spring, and the whole situation is one that invites sickness and death.

From such beginnings has risen whatever has resulted in the way of sanitary town sites in this mining region, and the work of betterment has been done not alone at the initiative of company officers, but through their continued care and watchfulness.

DIFFICULTIES THAT HAD TO BE OVERCOME.

The preliminary investigation mentioned above disclosed such conditions as have been briefly stated as incident to mining towns in which there is no thought of sanitation. This inspection pointed out the need of many changes, such as providing plenty of good water for all purposes; preventing the accumulation of kitchen waste, manure, or other unclean or unsightly materials; and eliminating insanitary privies that might distribute pollution by becoming breeding places for flies or feeding grounds for pigs. It also showed that the inhabitants should become imbued with a spirit of rivalry in cleanliness, and should feel proud of the improvements made and desire to make them permanent. All this presupposes the education of the individual—the same difficult task that has been met by many mining companies in their efforts toward greater safety in and about mines. And to teach the white inhabitants of these camps hygiene and sanitation is not easy. In the isolated and mountain settlements whence many of them come they are accustomed to a life of freedom from restraint. They do not readily perceive the necessity of a different manner of living when confined in comparatively close-built communities. A similar education of the negro miners is no simpler task.

It has been imperative that the work of improvement should be carried along with all the difficulties in mind and fully appreciated. The companies could not go ahead roughshod. They have been compelled to advance a little at a time, content if their steps did not have to be retraced; to remedy the worst dangers and to permit

the less serious ones to become evident to their men; to plan for to-morrow satisfied if the move of to-day was secure. They could not antagonize the persons on whose aid the whole scheme depended, even if those persons were the beneficiaries, and they had to draw their lines of restriction slowly, and always with a delicate finger on the pulse of public opinion.

WORK DONE BY LARGER COMPANIES.

In order to approach the problem of improvement of sanitary conditions properly, with the necessary data at hand, in 1910 the largest company in the Birmingham district made a preliminary investigation of living conditions among its iron-mine workers. From the facts brought out in this examination and from the recommendations made thereupon have resulted all the innovations that have been introduced in ontological conditions among the miners of the district.

Those companies that are engaged in betterment work are operators of both iron and coal mines, and they have made in coal-mining communities transformations similar to those in iron-mining villages, but this paper chiefly concerns the iron-mining villages. Whatever may be said in this paper concerning one applies with equal force to the other. Indeed, the camps of Edgewater and Docena, both coal-mine locations, are generally regarded as the most advanced type of company mine towns in the South, and as being as nearly the ideal as can be attained without an undue refinement of methods and a burdensome schedule of regulations. Edgewater is some 9 miles from Birmingham, and Docena was, until 1911, a convict camp, at which was employed a large number of State and county prisoners. In both these camps the operating company has had a free hand, for it controls the entire territory. It has laid out and constructed model villages that have large park spaces, well-grouped buildings of pleasing appearance, wide streets, an ample and convenient supply of good water, fenced lots, and well-arranged and honestly built dwellings of not too uniform architecture set in roomy grounds, and has enforced carefully worked out regulations as to the disposal of garbage and offal. Figure 1 shows the type of septic tanks provided at Edgewater.

If there is criticism to be passed on what has been attempted it is this: The work, even though sorely needed and skillfully handled, has been pressed rapidly; rules have been promulgated with what may seem to be a trifle too great celerity for comprehension and cordial cooperation by the individuals affected. But it is too early to base criticism on results; time alone will show the justice or error of the methods employed.

ORGANIZATION AND DUTIES OF COMMITTEES ON SANITATION.

The sanitary work of that company that has advanced farthest is directed by a committee. This committee is composed of the general superintendents of its mining departments, both iron mining and coal mining, the superintendent of its labor department, and a sanitary engineer who is constantly employed in the study and investigation of problems of sanitation. The vice president of the company is in charge of operations, and this committee reports directly to him. The function of the committee is to coordinate all sanitary work and to offer recommendations to the various departments of the company, whether they be iron or coal mining, iron or

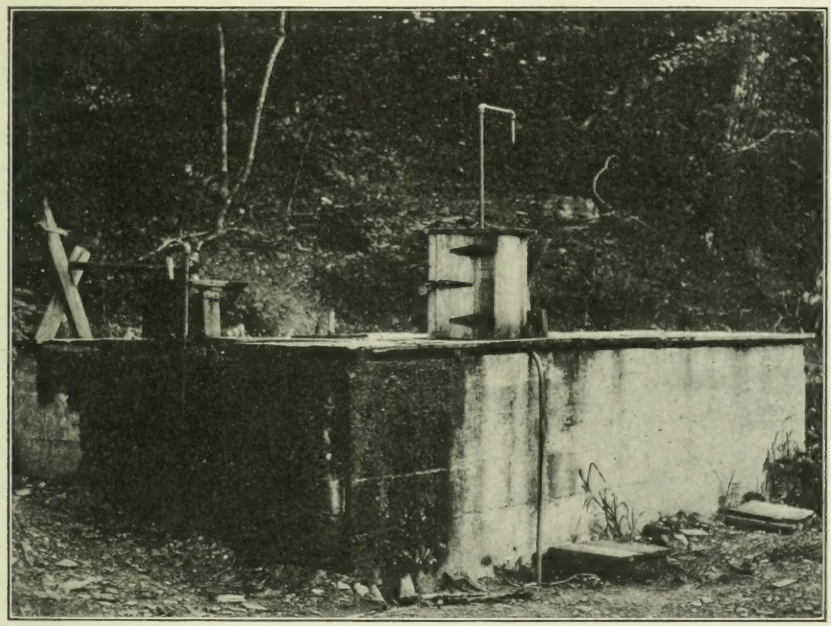


FIGURE 1.—Septic tank used at Edgewater.

steel making, coke burning, or railway operation. The actual work of sanitation, however, is carried out under the direction of the general superintendent of each department. A system of inspections and reports has been started by means of which information and recommendations are conveyed to the department heads. The scope of these inspections and the subjects covered by them are shown by the specimen report of inspection printed on page 25.

In addition to the general sanitary committee there is in the ore-mining department a board consisting of five physicians. This board has been in existence for the past seven years. It was formed as a sanitation commission long before any other step was taken

toward a change in conditions or before there was, aside from it, any sanitation department. The chief surgeon of the division is chairman of this board and his associates are division surgeons. The present duties of the board are the general supervision of all sanitary matters and the making of suggestions that appear to be pertinent and opportune as to the improvement of sanitary conditions in camps or to the betterment of the general health of employees. This committee also cooperates with the county health officers in matters of sanitation on property adjoining that owned by the company. In certain instances an undesirable condition would be found immediately outside company property, and by calling the county health officer's attention to this it would be remedied.

USE OF SANITARY CLOSETS.

The adoption of a general underground sewerage system for these camps has been impracticable. For such a system it is necessary that there shall be a fairly uniform supply of water, and in the summer months the supply is frequently not in excess of other requirements. Then, too, on account of the broken nature of the ground about the mines and villages, the cost of such a system would be excessive. The carelessness or ignorance of users of closets would probably result in closets being plugged or otherwise put out of order at frequent intervals, so that the cost of maintenance would be high. For all these reasons sanitary closets of the dry type have been provided at the various camps.[a]

These closets are placed near the mouths of all mine entries and in the vicinity of shops, boiler plants, and change houses. Every tenement is provided with a closet, with box receptacles for feces and with drop doors on the rear to permit proper cleaning. These doors fit tightly, in order to exclude flies. The closets are thoroughly cleansed and treated with lime twice each month during the summer and once a month in other seasons of the year. Refuse is shoveled from the boxes into tight wagons and is dumped at points about a mile away, where there are no habitations and no danger of contaminating local water supplies. This mode of disposal is only a temporary expedient, however, and it is probable that later developments will be in the direction of incineration by means of the waste heat of boiler plants. Experiments have been under way looking to this disposition of offensive materials and they promise excellent results. But no company in the district has plans for immediate advance in this direction. Experiments have been made in the use of tight iron cans as receptacles in the closets, these cans being taken out, replaced by clean ones, conveyed to the dumps in specially

[a] At Docena, a coal-mine village, the commissary, the schoolhouse, and about five dwellings have water-closets.

constructed wagons fitted with racks, and then thoroughly washed and cleaned before return and replacement in the closets.

WATER SUPPLY.

SOURCE OF THE SUPPLY.

Water supply for the ore-mining town of Fossil is drawn from limestone springs that have been tested and found to be unpolluted. Pumping stations are established at these springs and the springs are inclosed by frame or concrete houses with roofs, ventilators, and latticed walls (fig. 2) in order to prevent contamination. Water is

FIGURE 2.—Typical method of protecting sources of domestic water supply.

pumped to the several locations through iron pipes, and a 3-inch hydrant is provided for every five to eight houses. All houses renting above the minimum, such as are occupied by foremen and others in authority, have running water inside.

At Ishkooda water for drinking purposes is obtained from wells drilled from 60 to 180 feet in limestone. A spring so near the houses that its use could not be easily prevented has been covered, provided with a concrete basin, and placed in such sanitary condition that its use is not an element of danger. Water for washing and industrial purposes is obtained from a near-by pumping station on Scotts Branch. In one of the mines named Muscoda, a large stream of excellent water

flows from the limestone roof; this water is pumped to surface and distributed through mains to the dwellings.

INSPECTION OF SUPPLY.

The purity of the water supply is recognized as of vital importance, and in order to insure its purity, the sanitary inspectors pay especial attention to the source, condition, and possible pollution of all water used. On a later page of this paper is printed the form that is used by these inspectors for such water-inspection reports. As a further safeguard, a bacteriological examination is usually made twice a year of all water used for domestic purposes. Until recently this work was done by chemists employed for the task, but it is now carried on at the Ensley laboratory of the company, which has been equipped for the purpose with apparatus recommended by the American Public Health Association. Maps have been prepared to show the source of water supply for each division, and instructions have been issued with regard to the collection and handling of water samples. A copy of a typical water map is given in Plate I.

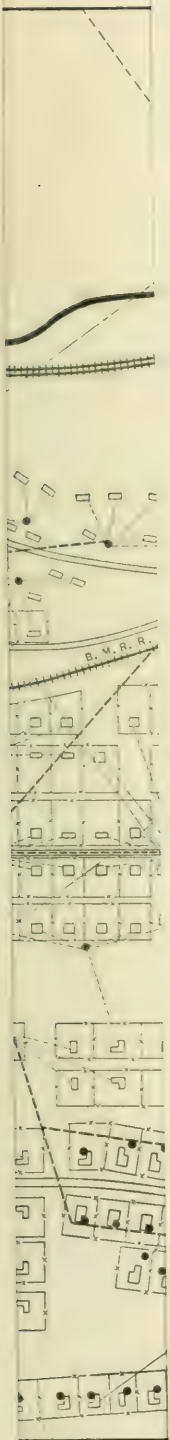
If the examination reveals the fact that the water is contaminated, an investigation is made to find the source of contamination. If this can be eliminated by properly protecting the well or spring, it is done. If, however, the contamination is of subsurface origin or beyond control, the spring or well is filled.

During the year 1912 the leading company made 848 analyses of drinking water used by its employees and their families, as the result of which it abandoned 49 sources of supply that were found to be polluted. Water filtration plants have been installed at the coal-mining villages of Edgewater and Docena (fig. 3), and at Ketona Quarry. A large plant is under construction at Blocton.

DISPOSAL OF GARBAGE.

To insure the general cleanliness of the villages, the company employs men whose duty is to keep things neat about the camps, to cut weeds and brush and burn old timber, to collect scrap, and to carry away ashes from the boiler houses. Grounds around company buildings are kept grassed or are covered by crushed rock and are kept clean. All buildings are kept painted, and trash and waste are removed at regular and frequent intervals. The companies insist that tenants keep their premises free from rubbish of every sort; trash or garbage barrels are placed for this material and are removed by the company's wagons. All this refuse is hauled to some point away from any habitation or source of drinking water and is destroyed.

Care has been taken to provide drainage from boiler houses and their vicinity, and all company roads have ditches, concrete bridges,



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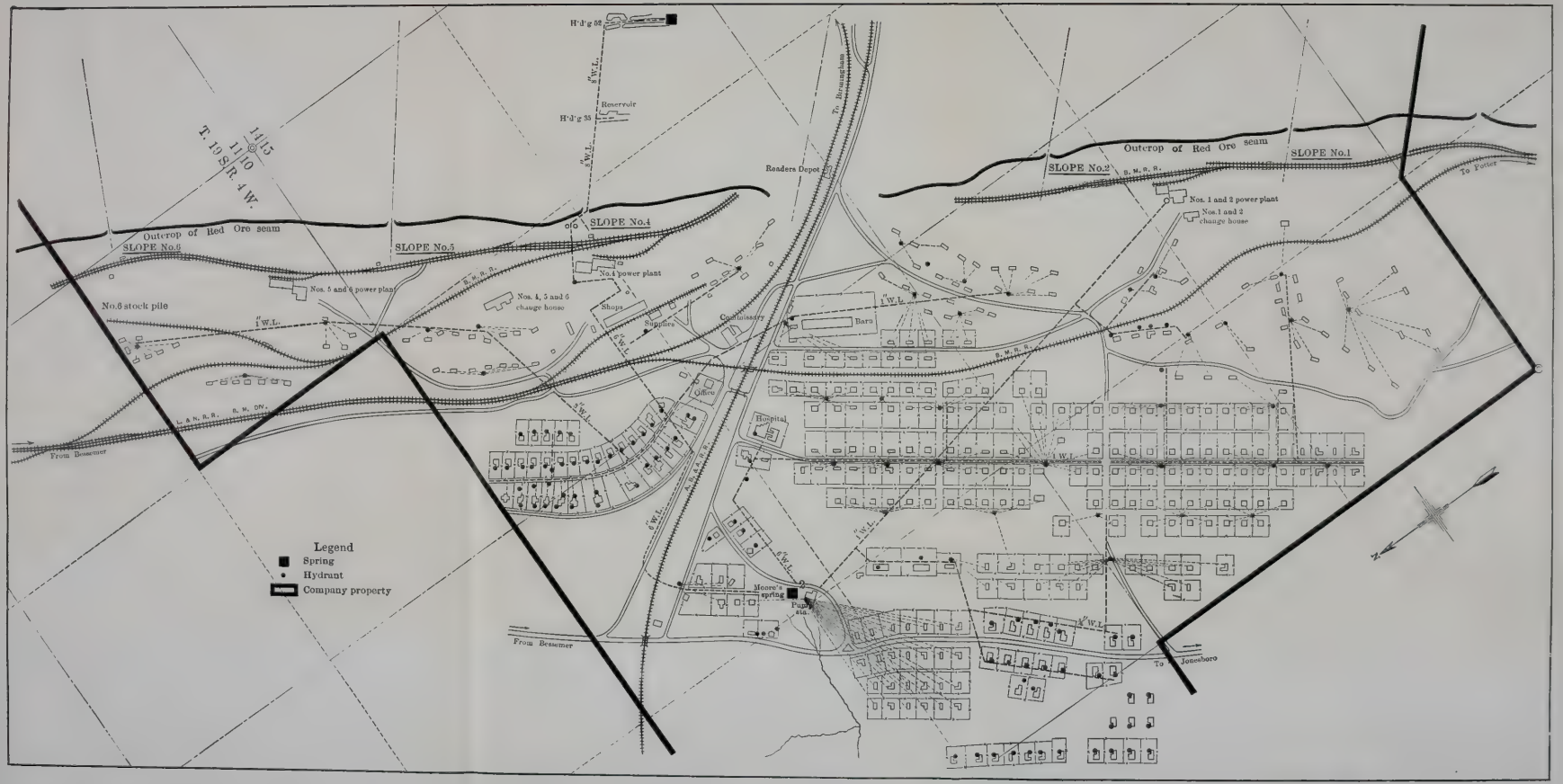

SOURCES OF WATER AND DISTRIBUTING SYSTEM AT MUSCODA. SCALE, 1 INCH=587 FEET.

and tile drains. Low places about villages are drained, and all water that can not thus be removed is covered with oil to prevent the breeding of mosquitoes and the consequent spread of malaria.

The largest mining company has taken the position that hogs at large about its villages are insanitary and a nuisance, and has issued an order that they be kept off. Time was given the owners to dispose of their animals, but there was a loud outcry against this order, which was characterized by some villagers as despotic. The negro considers his family hog as so much free meat, and objects strenuously to any curtailment of the privileges of this convenient scavenger.

FIGURE 3. Filtration plant at Docena.

BATH AND CHANGE HOUSES.

A complete system of bath and change houses has been installed by one of the large companies, and others follow its example more or less closely. These houses are installed by the largest company operating in the district, are of standard brick construction with concrete floors, and separate lockers and washrooms for white and for colored employees. The houses contain shower baths and troughs, with hot and cold water connections, and are kept warm and in order. This company charges 50 cents a month for the use of lockers and the bath privilege, claiming that the charge causes the men to make

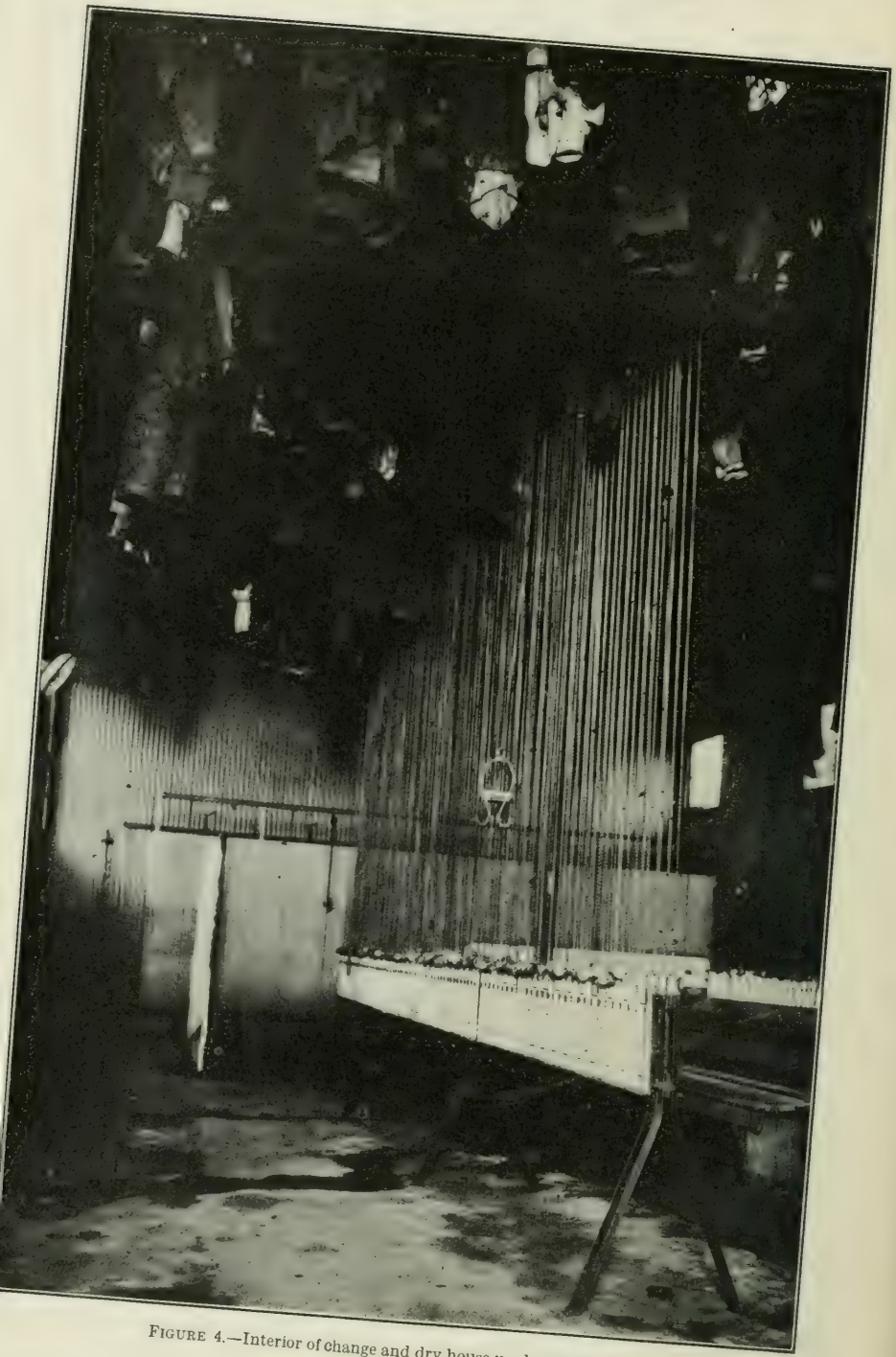

FIGURE 4.—Interior of change and dry house used at Edgewater.

better use of the facilities provided. It is found that by far the greater number of employees, both white and colored, take advantage of these facilities. Before the establishment of these change houses underground employees who had to bathe did so at their homes, where bathing facilities usually were poor. As the men were often wet to the skin when coming from the mine and had to go from the slope mouth to their homes while still clad in their soaked clothing, there was much sickness. When rain fell at the time of going on shift, many men would stay at home rather than arrive at work in wet clothing. The result was bad, both for the men whose earnings were reduced, and for the company whose working force was unnecessarily diminished.

It is believed that the charge of 50 cents per month for the privileges of these bathhouses will be continued indefinitely, although the company did expect to make them free to its men. It is stated that the accommodations are appreciated better when there is a charge, and the charge covers only the cost of operation. Under the present arrangement all the lockers are subscribed for and the baths are well patronized.

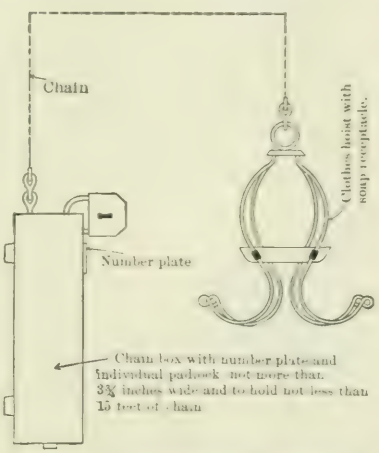
Chain
Clothes hoist with soap receptacle.
Number plate
Chain box with number plate and individual padlock not more than 3¾ inches wide and to hold not less than 15 feet of chain

FIGURE 5.—Details of clothes hoist used at Edgewater dry house.

AN IMPROVED TYPE OF CHANGE HOUSE.

A new style of change and dry house (fig. 4) has been installed at the coal-mining camp of Edgewater by the company operating the mines there. It deserves careful consideration and has some features that recommend it to the operator who is seeking to improve hygienic conditions. Lockers are abandoned as not sanitary, and all clothing is carried on trays and hooks in the upper part of the room, many feet above the heads of the men, where there should be abundance of warm air in free circulation. Each man has, instead of a locker closet, clothes hooks (fig. 5) and an attached tray that by means of a light chain can be hoisted nearly to the ceiling of the dry room. The chain is secured by a padlock. A miner can lower the tray and get his effects, or he can pull them up out of the way, when, by locking the chain, they will be as secure as though in a metal closet. By the use of this system the floor of the dry house is not cumbered with long rows of steel closets containing wet clothing, and, theoretically at least, less floor space is needed to accommodate a given number of

men. With proper ventilation for the building, clothes air and dry quickly and the foul odor from them passes off unnoticed. This system of handling clothing in a dry house is in use in parts of Europe, notably in Germany, where it has been found that the cost of installation is less than that of steel lockers. It is believed that ceiling hooks have been placed in change houses at very few American metal mines.

Practically, certain objections to this type of change house have developed in its operation here. For instance, the dirty clothing of men who are off shift is left hanging on the hooks, so that the clean clothing of men who are at work must be hung in direct contact with

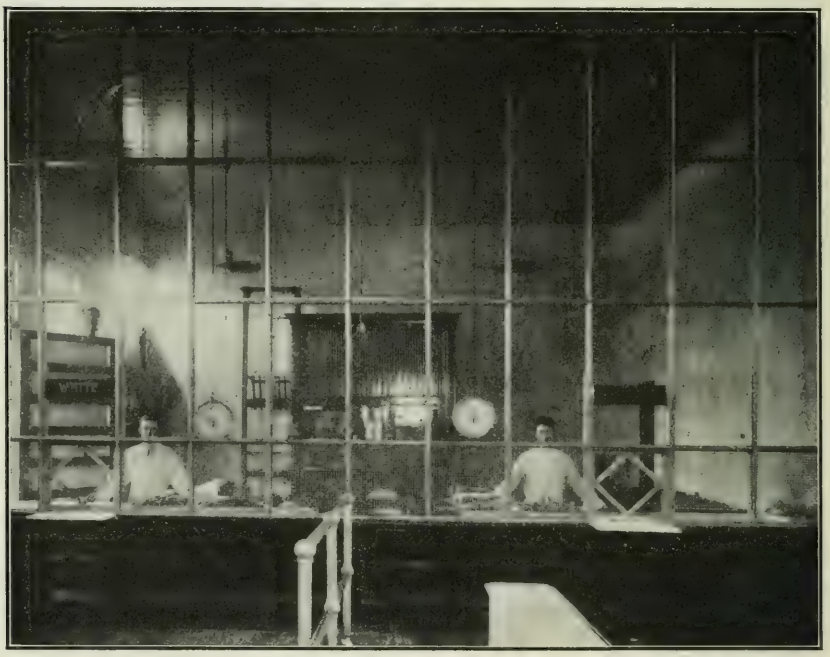

FIGURE 6.—Sanitary meat market at Edgewater.

it. If the spacing of the hangers is sufficient to avoid this difficulty, there is little or no gain of space over the usual arrangement of lockers, while without such spacing ventilation is not free enough. However, these objections do not seem to outweigh the benefits to be derived from this system.

PROTECTION OF FOODSTUFFS.

The protection provided for food supplies is careful and thorough, so that now the average mine commissary is cleaner and more sanitary than many shops in the adjacent cities of Bessemer and Birmingham. Markets (fig. 6) and bakeshops present an appearance as

attractive as those of most cities. There is no sale for uninspected meats, their exposure for sale being forbidden. In order that flies may not contaminate meats, the meat stalls in commissaries are completely inclosed by wire screens (fig. 6), and hygienic devices are in use both in the refrigerator rooms and the spaces outside. Perishable foods other than meats are covered and protected, and the attendants endeavor to reduce to a minimum the handling of anything intended for the table.

HOSPITALS.

All these iron-mining companies maintain hospitals in their several mining communities. The largest company has three for its iron-mining department, including a general hospital at Muscoda and emergency quarters at Fossil and Ishkooda. The hospital at Muscoda is the headquarters of the chief surgeon. It has an X-ray apparatus, a suitably equipped laboratory for microscopic work, a sterilizing room, and all the paraphernalia of a well-appointed hospital. The hospitals at Fossil and Ishkooda are intended for the treatment of accident and emergency cases only. Tubercular patients are isolated in a tent at the general hospital, and all cases of contagious and infectious disease are set apart. Employees who are injured underground are taken to the slopes in a mine car, if necessary, and to the surface on a skip, man cage, or larry. Stretchers and blankets are kept in lockers at the tally houses at the mouth of each slope and first-aid supplies at the change houses. The injured are cared for as occasion requires and are taken to the hospitals if such action is necessary. As some of the mines are near the heads of steep and roundabout wagon roads, it has been found that if the injured are attended to first at the change houses they receive quicker treatment than if taken at once to the hospitals.

In addition to the treatment of accidents and contagious diseases the company provides medical attendance for sickness and noncontagious diseases.

WORKING CONDITIONS IN THE MINES.

The conditions under which men work in the iron-ore mines of Red Mountain are in the main good, and are better than the average among metal mines throughout the United States. This is so because the mines are rather dry and the circulation of air is free. The thickness of the workable ore seams in most of the productive parts of the district and the gentle dip of the ore beds give men an opportunity to work with more comfort than would be the case were the seams thin and the beds more nearly vertical. Many of the main slopes are connected by crossheadings near the breasts, and the ventilation of such slopes is excellent. In nearly all the

mines of the district, aside from two operated by one of the larger companies, the natural circulation of air is so free that artificial ventilation is not required; in the two noted it is not provided. A few mines in outlying portions of the district are working seams so thin that their stopes are not more than 48 inches high, but in the central part, between Birmingham and Bessemer, there is ample headroom. In such mines as are not well ventilated and in which a smoky illuminant is used, the ventilation is poor and the miners are unable to get out as high a tonnage as elsewhere.

Most of the mines are provided with manways that come to surface some distance from the mouths of the slopes, but in some cases these end in connections with the slopes some distance from surface, so that their value is lost. The manways are, of course, for two

FIGURE 7.—Miners' dwellings at Rock Run. An example of village planning obtained by one company under exceptionally favorable conditions.

purposes only—to provide an independent way in and out of the mines in case of accident and to eliminate the dangers met by men traveling the openings through which skips and cars are constantly run at high speed. Unless these manways continue to the surface and afford independent passageways they might about as well not exist at all. In the cases of those companies employing the largest number of men and shipping the most ore the manways are carried quite to surface and men are not permitted to use the main slopes as passageways. Some of the slopes in this district are more than half a mile long from surface to breasts, and in most of these long slopes cars are furnished for taking men to and from their work. These man cars are kept on sidings close to the mouths of the slopes and

are attached to the hoisting cables and swung into place at stated times. Where they are used, men are not supposed to ride in or out on skips or ore cars.

CIVIC IMPROVEMENTS.

Living conditions, such as relate to welfare rather than strictly sanitary aspects, in the mining villages have been improved recently. A large proportion of the dwellings occupied by employees of the two leading companies are built of good material and with care; the grounds in which they stand are large enough for gardens (figs. 7 and 8) and are fenced; streets and roads are graded and maintained; separate churches, schools, and lodge halls for white and negro employees have been provided at all villages of several companies,

FIGURE 8.—Bird's-eye view of mining camp of Ishkooda on Red Mountain.

and where it has been found necessary the companies have maintained the schools. One company recently appointed a superintendent of education, who will devote his entire time to improving and standardizing the schools in the various villages controlled by the company. At some places grounds have been graded and laid out for baseball and other games, and at most of the more important locations the companies are willing to assist in providing recreation.

CULTIVATION OF GARDENS.

As an incentive to the cultivation of truck gardens in the yards surrounding the homes of employees and in order to assist in beautifying private grounds by fostering rivalry and the hope of reward,

the largest company has put in operation a system of prizes for gardening results and expects its employees to call on its garden inspectors for advice and direction. These contests are under the following gardening notice:

The company will again offer prizes, as was done in 1910, 1911, and 1912, to the employees of the mining departments for the best gardens produced at each division. These will consist of three prizes for white employees and three for colored employees, and will be in the following amounts: First prize $25, second prize $15, third prize $10. Awards will be made only to employees occupying company houses. Gardens will be inspected in May, June, July, and August, and prizes will be awarded following the final inspection. The inspector will consider the neatness and orderly arrangement of gardens, as well as the character of the growing crops. Salaried employees are not eligible for this competition. The minimum number of gardens in any one division shall be 10 for white and 10 for colored employees, and if there be a lesser number for either whites or negroes the gardens for persons of that color shall not be eligible for competition and announcement of this fact shall be made immediately after the second inspection.

There were 868 gardens inspected under this competition in 1912, which was an increase of 35 over the preceding year. Early in the year plans were made to establish model gardens at the larger camps, for which additional prizes were offered, the idea being to further stimulate the efforts of competing gardeners. In each case a map was prepared of the garden space to be used, showing the area to be planted in different crops. These were accompanied by lists of seeds to be planted during the season, and brief instructions were given as to care and cultivation, so as to keep a growing crop on the land at all times. This work was taken up so late in the spring that many of the competitive gardens had been planted, and it was not possible to obtain as good results as would have been the case had the movement been started earlier. However, some of the results were decidedly satisfactory, and in some instances where careful records were kept it was found that the profits to the gardeners amounted to $50 each. The year 1913 is expected to show an extension of this intensive work, and more gardens from which a profit is derived. At those mine camps where the most successful model gardens were grown it was noticeable that the number of gardens containing fall and winter vegetables was greater than at other divisions.

The efforts of this company during 1913 will be directed largely toward teaching the men to plant crops in succession and to continue their work later in the year, and the final inspection of competing gardens will be made at a later date than previously.

INSTRUCTION IN HYGIENE.

The largest company now employs visiting nurses who, in addition to the work usually incident to their profession, instruct mothers in the duties of motherhood, wives in the best methods of cooking and

housekeeping, daughters in sex hygiene and the fundamentals of eugenics, and all persons with whom they come in contact in good citizenship and the conduct of life.

INCREASED EFFICIENCY OF WORKMEN.

Statistics of death rates and loss of time due to illness can not be presented in making comparison of present conditions at these camps and those of previous years, for the reason that such records were not kept during the time preceding the making of those improvements for the benefit of workmen which are described in this paper. But it is probable that the results of these improvements can be measured by the increased efficiency of the working forces, and this is evidenced to some extent by the fact that in 1907 the ratio of the number of men carried on the pay rolls of a certain company to the number of men at work was 147 to 100; in other words, about one-third of the men taking wages from the company were absent from duty. In 1910 this ratio had been reduced to 138 to 100, and in 1912 it was 122 to 100, thus showing a steady improvement in the proportion of men at work. During that period the gross number of individuals on the pay rolls has increased materially. A division of the wages formerly paid to 147 men among 122 means a decided advance in individual earnings.

WHAT HAS BEEN DONE AT ONE VILLAGE.

As a concrete example of what has been done in the way of betterment of living and community conditions the coal-mining village of Docena is described below. It is not the intention of this paper to enlarge upon this village as a model for other companies to follow, since conditions and possibilities differ, and what may be feasible for one employer may be impracticable for another, but Docena is an example of the latest and most advanced type of mine village in the district, and perhaps in a far wider circuit, and this description can not fail to be of value.

STREETS AND PUBLIC BUILDINGS.

The layout of the camp is in rectangular blocks grouped about a central plaza, and certain features of the plan were adapted from Spanish or Central American practices as applicable to the warm climate of the Birmingham district. The blocks are subdivided into lots measuring 60 by 120 feet, and hence having an area of 7,200 square feet. Streets are 50 feet wide from property line to property line, have easy grades, are macadamized, and lit with electric lights. Gutters and sidewalks are made, and grass areas or parkings are provided between sidewalk and gutter.

On one of the high knolls of the plat is the plaza, around which are grouped the company buildings, the church, and the school, all being of substantial brick construction. Attention has been given the appearance of these buildings, and they are attractive in design as well as adequate for their purposes. Winding paths from the different thoroughfares lead to the center of the plaza.

TYPE OF DWELLING.

Most of the houses of the camp are of a standard four-room double-dwelling type, clapboarded, with hip roofs covered with cypress shingles. They rest on brick piers, are equipped with electric lights, and have running water piped to the kitchen sink and elsewhere. Other houses have a slightly different style of porch and are single instead of double. Several somewhat more elaborate dwellings have been erected for the use of mine foremen, the superintendent, and others. The houses are painted in a variety of harmonious colors, the intent being to relieve monotony, which has characterized mining villages in the district, without causing an incongruous appearance.

TYPE OF OUTHOUSE.

In the rear of each house and adjoining the alley which separates the lots is a combination coal bin and privy. (Fig. 9.) The privies are of a standard construction, are properly ventilated, and are provided with water-tight cans or receptacles to render soil pollution impossible. Efforts were made to have these privies fly-proof, as transmission of typhoid and certain other intestinal diseases by flies is a very important sanitary consideration. They are fitted with a tight flap door in the rear for the removal of cans, which at regular intervals are taken away in a specially designed wagon in charge of a sanitary man employed by the company, and are conveyed to a septic tank for proper disposal. When one can is withdrawn through the rear door of a privy it is replaced by a clean one. The wagon passes through the alleys in the rear of the houses and not along the main streets. A galvanized-iron garbage can and also a wooden trash barrel are furnished each house and removed weekly by a company employee. Tenants are required to keep their premises in a clean and sanitary condition, and if they fail to do so the work is performed by the company at their expense.

THE WATER SUPPLY.

Two sources of water supply are available for the town. The main supply is obtained from a water-bearing stratum in the main mine shaft, 60 feet below the surface and above the coal beds. It

is pumped to a receiving basin, passed through a slow sand filter, and then pumped to a tank that stands high enough to give good pressure throughout the town. (Fig. 3.) Cast-iron pipe is used for the distribution system, and there are no dead ends. House connections are three-fourths-inch galvanized-iron pipe. Fire protection is afforded by numerous hydrants and by hose at convenient places. An emergency water supply is provided by means of a surface reservoir.

As at other settlements, bacteriological examinations of the water are made at regular intervals in order to insure the purity of the supply, and proper corrective measures are adopted as found

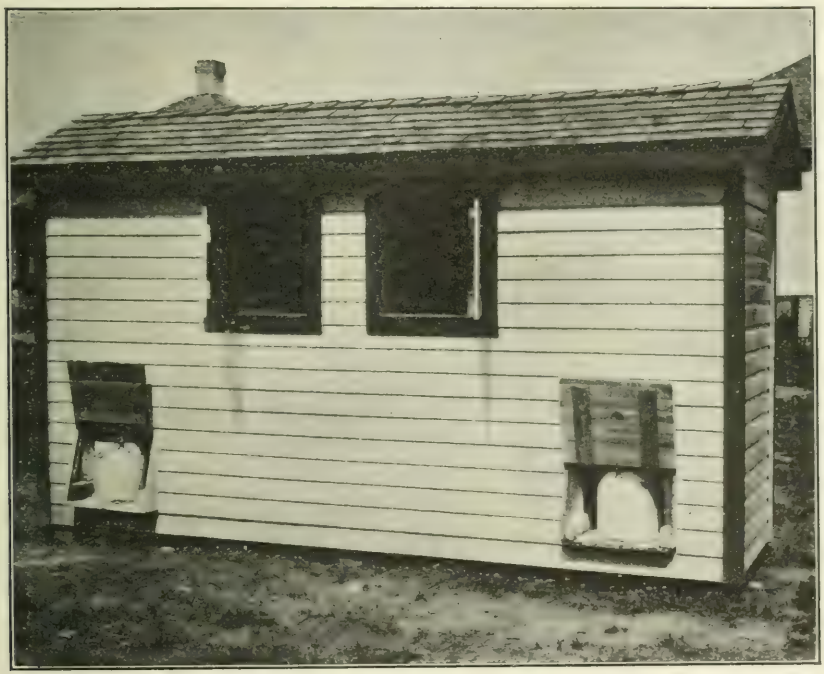

FIGURE 9.—Rear view of combination coal bins and privies for two dwellings. The lower doors are set at an angle so as to close tightly.

necessary. In one instance in which the main supply proved to be contaminated by surface water, this water was excluded by a concrete ring built about the shaft, preventing the entrance of any surface water.

BATH AND CHANGE HOUSE.

A short distance from the mouth of the shaft is the bath and change house. This house is well ventilated and heated, is provided with lockers, hot and cold water taps, and shower baths. This bath and

change house tends to greater cleanliness in the home, as the dirty clothing worn in the mine is not taken away from the building.

THE HOSPITAL.

A hospital well equipped to handle almost all cases of injury or sickness is in the charge of a competent physician, who also looks after the health of the town in general. First-aid teams have been organized and trained. At the mouth of the mine is a man who checks all men entering or departing, so that at any time it is possible to know who is underground.

AMUSEMENTS.

A clubhouse has been built for the use of colored employees, who are much in the majority at this town. It has a reading room, pool and billiard room, bowling alleys, and refreshment counter. It has been found that there is considerable musical ability among the miners, and an instructor has been employed by the company to train the bands organized at the various mining divisions. These bands furnish music for camp concerts, at first-aid contests between teams from the several mining divisions, and at other times. A baseball ground has been laid out for adults. A playground for children is equipped with standard playground apparatus.

EDUCATIONAL AND RELIGIOUS FACILITIES.

There is an attractive church and schoolhouse for white employees, and the former convict chapel has been converted into a church and school for colored persons.

The company employs a lecturer who gives periodical lectures to the miners at the different operating headquarters. These are illustrated by stereopticon views and are along educational lines connected with the work, advanced mining methods, first aid, etc.

THE COMMISSARY.

As is usual, in this district there is a commissary or company store. The building is of brick and is situated in the center of the town. It furnishes such goods as are in demand in a mining community, and the supply is as near standard quality as may be. That part of the commissary in which fresh meats, vegetables, fruits, etc., are kept is carefully screened and provided with large refrigerators.

FORM OF INSPECTION REPORT.

The following is a copy of the regular inspection report of the sanitary department of the largest company, and is presented as showing the manner in which this work is carried forward by that company:

Inspection report of the sanitary department of a large mining company.

Camps or works ..... Date..... Inspector.....

1. Closets:
   - A. Character or type of closet.
     If dry type, flap down. Seat covers, and as to whether these doors and covers are in good repair and fit tight and are kept closed, except during removal of feces. Period of removal of feces, regularity, neatness in performing this work. Lime used, when purchased, quantity used per seat. (Lime should be procured from ..... works.)
   - B. Character or type of sanitary wagon employed in the collection and removal of feces. (This wagon should be of such a design as will not permit the escape of any of the contents or the emission of obnoxious odors or unnecessary exposure of contents to passing insects.)
   - C. Method of disposal of contents of sanitary wagon. (This material should be mixed with wood or coal and burned, if possible.)
     Cleanliness in the work. Liming or otherwise disinfecting the wagon.
   - D. Can of garbage, method and frequency of removal; disposal.
   - E. Can of trash, method and frequency of removal; disposal.
2. Water Supply:
   - A. Springs: Location, character, condition. Should be cleaned and surrounded with concrete to prevent waste water, storm, or surface water from entering. Should be covered with a peaked roof, stationary cover, and water taken from a pipe set into the concrete at side or in front of concrete wall. No buckets or other implements should be dipped into the springs.
     Hydrants and source of supply.
     Location of hydrants.
     Number of hydrants per house.
     Dug wells: Location, character, condition. Should have cement base around well and suitable drainage away from well to care for waste water.
     Bored wells: Location, character, condition. Should have cement base around well and suitable drainage away from well to care for waste water.
   - B. Laboratory tests: Such tests to be made by the ..... laboratory at frequent intervals to insure proper condition of water supply.
   - C. All water supplies to be investigated and those not in good condition to be abandoned or filled up.
3. Commissary Meat Markets:
   - A. Exclusion of flies.
   - B. Provide toilet facilities.
   - C. Cheese, bread, butter, cakes, and candies to be kept in suitable cases to exclude flies, and also to prevent rapid drying of contents.
   - D. Fowls to be kept in neat stalls outside of market.
   - E. In the sweeping of commissaries, dust to be kept down either by moistened sawdust or sprinkling with water.
   - F. The manager of commissaries see that patrons and others do not scatter refuse around building or grounds; that grounds are kept neat, clean, and orderly.
   - G. Vegetables and fruit to be kept in covered screen receptacle or bins.
4. Stagnant Pools or Ponds:
   To be abolished or filled in. Old cans, bottles, uncovered rain barrels to be disposed of.
5. Weeds:
   To be cut at frequent intervals by tenant. When not done by tenant, work will be done by the company at the cost of the tenant.

6. Milk Supplies:
   Company surgeon to investigate method of handling milk by those furnishing same to commissaries or camps. Report will be made on conditions found, and if unsatisfactory, supply from that source will be prohibited until conditions are corrected.
7. Stables:
   Location, character, and condition. Disposal of manure and offal.
8. Hogs:
   Not allowed on company premises.
9. General Conditions:
   Tenement yards, streets, etc.
   Commissary yards, streets, etc.

FORM USED FOR WATER ANALYSIS.

The following form is that used for chemical and bacteriological examination of water supply, and has been mentioned on a preceding page.

Water analysis report.

FROM.....WORKS.....DEPT.....CAMP.

LOCATION OF WATER SUPPLY.....

NUMBER OF WATER SUPPLY.....TYPE OF WATER SUPPLY.....

METHODS USED.....NO. HOUSES SUPPLIED.....NO. PEOPLE SUPPLIED.....

Lab. No.	Date of.		Collected by—	Analyzed by—	Physical exam.			Chemical analysis (parts per million).											Bacteriological exam.				
	Collection.	Examination.			Turbidity.	Color.	Odor (cold).	Oxygen consumed.	Nitrogen as—				Chlorine.	Total solids.	Suspended solids.	Iron.	Total hardness.	Alkalinity.	Carbonic acid.	Bacteria per c. c.		B. coli communis.		
									Albumenoid ammonia.	Free ammonia.	Nitrites.	Nitrates.								Nutrient gelatin agar at 20° C.	Lactose litmus agar at 37½°.	0.1 c. c.	1.0 c. c.	10.0 c. c.